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MONTHLY REPORT

ON THE NUCLEAR FUEL MARKET

NUEXCO

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MONTHLY REPORT ON THE NUCLEAR FUEL MARKET

January 1986

No. 209

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NATURAL URANIUM AND SECONDARY MARKET CONVERSION

(All data as of December 31, 1985)

The **Exchange Value** is \$17.00 per pound U_3O_8 , up \$0.25 since last month. **Active supply** of natural uranium (concentrates and UF_6) for spot or near-term delivery totals 3,595,000 pounds U_3O_8 equivalent, down 20,000 pounds since last month. The corresponding figure for **active demand** is 2,325,000 pounds, up 55,000 pounds. The spot and near-term **supply-demand ratio** fell to 1.5:1.

The *Current Market Data* section of this Report lists seven natural uranium sales, involving approximately 900,000 pounds U_3O_8 . All of the transactions involved near-term delivery and also met the criteria for inclusion in the current Transaction Value calculation.

The **Transaction Value** is \$16.55 per pound U_3O_8 , up \$0.75 since last month. The considerable rise is due to the large number of December transactions (at prevailing prices) meeting the requirements for inclusion in the calculation.

The **UF_6 Value** is \$47.00 per kilogram U in UF_6 , up \$1.00 since last month.

The **Conversion Value** is \$1.60 per pound U in UF_6 , unchanged since last month. Active supply of secondary market conversion services for delivery within three years totals 300 thousand pounds U as UF_6 . No active demand and no secondary market conversion transactions are reported.

The **Loan Rate** is unchanged at 5 percent per annum.

* * *

The Exchange Value continued its gradual rise as several utilities made purchases, effectively clearing much of the lower-priced material from the market. Traders played an active role in this month's transactions, selling material to utilities in Europe and the USA mostly at bargain levels. A number of utilities have entered the long-term market, and their purchasing decisions in the coming months could have a significant impact on the long-term price structure and, through feedback, on spot market prices. Many sellers are willing to offer above the \$17.00 level, but if prices are to continue to move upward, demand must be sustained and sudden large inventory liquidations avoided. Demand has moved closer to supply over the past several months, but has not yet exceeded it.

The UF_6 Value also rose this month. As offering prices for uranium concentrates rise, sellers of UF_6 in turn expect higher prices in that thin market.

The continued decline of the US dollar relative to most other currencies resulted in a net decline in the effective Exchange Value for three uranium-consuming countries — Belgium, France, and the Federal Republic of Germany. The slight rise in

the Exchange Value (expressed in US dollars) did not overcome the dollar's decline in those countries' currencies, again discouraging non-US sellers of spot or near-term material.

* * *

DOE and the US uranium producer group at year's end were still attempting to negotiate a settlement of the federal court lawsuit. As previously noted, the issues are such that none of the competing interests will be completely satisfied with an eventual resolution. DOE believes that any limitation on the enrichment of non-US origin uranium for domestic use would adversely affect its enrichment enterprise, fearing that US utilities, seeking the lowest cost of enriched product, might be motivated to abandon DOE in favor of non-US enrichment to utilize with available supplies of lower-priced, non-US uranium. Indeed, this month there were even reports that SWU from the USSR might be offered in the US in the near future.

Most of DOE's customers, both in the US and abroad, are perplexed as to how such a situation was allowed to come about. From a business point of view, there is a sense that while DOE devised an attractive enrichment contract, it did so for the wrong reasons and at the worst possible time. The reasoning behind and need for DOE's dramatic pricing initiatives were suspect from the outset, particularly in view of two anticipated factors:

1. The decline of the US dollar against foreign currencies;
2. The evaporation of the secondary market for enrichment services.

While outwardly opposing any embargo and exhibiting little sympathy for the US producers, many US utilities, unhappy that the validity of the US enrichment contract has been brought into question by the producers' lawsuit, would likely accept some type of limited embargo as the price of removing the uncertainty surrounding the contract. The governments of Canada, Australia, and other uranium-producing countries naturally have made it quite clear to the US government that they would view an embargo as a most unwelcome event. Shrinking the demand available to existing and prospective non-US producers would create additional downward price pressures as these producers competed for a share in a reduced market. The imposition of such an embargo could also invite retaliatory actions from those countries for which uranium is an important source of foreign exchange.

Even the US producers do not appear to be of a single mind on this issue. Some, already committed to withdrawing from the uranium business, seem primarily interested in mills tailings legislation. They largely support the embargo solely as a means to increase prices and property values, enabling them to dispose of their uranium-related assets and associated tailings liabilities.

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Others are committed to staying in the business and view an embargo, and the expected higher prices, as essential to their survival. However, it is doubtful that anything other than an immediate, high percentage (75 to 100 percent of non-US uranium) embargo would have the desired effects in the near-term. Prices appear to have bottomed, and a slow recovery underway for eight months continues. Nevertheless, buyers appear unconcerned, hard demand for near-term delivery is slight, and most of the recent upward price movement was a consequence of discretionary buying. In the past, this type of buying tended to evaporate as prices strengthened, usually followed by a new round of inventory selling and a new price cycle. Large blocks of excess inventory remain, and recently have become the subject of considerable attention by public utility commissions. This situation in turn could presage new liquidations. Only a high-percentage embargo, possibly with strict grandfather provisions, is likely to have sufficient shock value to alter existing perceptions.

* * *

ENRICHED URANIUM AND SWUS

The **SWU Value** as of December 31, 1985, is \$80 per SWU. This refers to SWU at a tails assay of 0.30 weight-percent U₂₃₅ and for delivery within one year. One secondary market SWU transaction is reported this month, involving 50 to 100 thousand SWUs of DOE origin.

The DOE-certifiable and non-DOE or non-certifiable SWU Values were merged this month as the sole remaining buyer restricted to purchasing DOE-certifiable SWU filled its requirement. Following that utility's purchase, sellers of certifiable SWU must now compete with sellers of non-DOE SWU for buyers without origin restrictions. Thus, the revised indicator measures the secondary market for SWU available for delivery within one year regardless of origin.

The small price increase reported this month (an increase of \$2 over last month's \$78 per SWU value for either origin) represents both a continued reluctance on the part of the large European non-DOE SWU sellers to offer SWU at prices as low as in the past, as well as a decision by one leading seller to raise its prices. The decline of the US dollar relative to most European currencies has made it impossible for European sellers to obtain the same prices in their currencies that could be obtained during the first half of 1985. Meanwhile, the continuing uncertainties regarding the status of the USEC have created the potential for

new buyers in early 1986. Thus, lacking active buyers at present, sellers have generally resisted reducing prices and are electing to wait for new buyers to appear.

This month, a large inventory seller that had been aggressively seeking buyers was able to obtain commitments for about 60 percent of its SWU. This seller now is attempting to secure higher prices for the remaining SWU, even though there is little active demand. Although potential buyers do not appear sufficiently motivated to purchase now, Nuexco expects a number of buyers to appear in the coming months as a consequence of new market developments.

* * *

DOE INCENTIVE PRICING OFFER, FY1991-1995

The recent incentive pricing proposal for fiscal years 1991-1995 issued by DOE to all of its Utility Services contract (USEC) customers appears to lack firm economic benefits. As with DOE's previous incentive pricing proposals covering FY1987-1990, DOE is offering to sell SWU at low prices to customers with uncommitted requirements. The price per SWU under the offer is the lower of the USEC price or the price determined by the following formula:

$$\text{Price} = \$85 = \frac{(85)(I_m - I)}{I}, \text{ where}$$

I_m = Implicit Price Deflator for the US GNP (Gross National Product) at the end of the second quarter of the calendar year preceding the fiscal year of delivery.

I = 230.55, which is the Implicit Price Deflator for US GNP for the second quarter 1985.

In order to receive this SWU price for their uncommitted requirements, a customer must agree to purchase *all* of their uncommitted requirements for FY1991-1995 from DOE under the proposal. DOE has set February 21, 1986 as the acceptance deadline.

In most cases, the proposal covers the 30 percent of requirements that USEC holders are normally allowed to purchase from sources outside their DOE contracts. It has been reported, however, that a special case exists for DOE customers that had partially terminated under their old Requirements contracts. These customers converted to the USEC under the provision that

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they would be allowed to purchase a higher percentage of their requirements on the open market for the years previously terminated. These customers also will be allowed to purchase the incentive-price SWU for those higher percentages. Conversely, a number of customers already are committed to buy more than 70 percent of their requirements from DOE as part of their USEC conversion terms. These customers will receive 30 percent of their requirements at incentive prices under the DOE proposal, regardless of the prior commitment, provided they commit to purchase 100 percent from DOE from FY1991-1995.

Concurrently, DOE agreed to waive the variable tails assay option (VTAO) fee for any year in which a USEC customer is committed to purchase 100 percent of their enrichment services from DOE. This offer commences in FY1987 and apparently extends indefinitely until revoked. DOE indicated that this offer was based on the Secretary of Energy's finding that the US uranium industry was non-viable, and was intended to help rectify this situation by increasing the use of natural uranium.

Actual Market Impact

Initial reactions to the DOE proposals among USEC customers were mixed. Some USEC holders are still concerned that the USEC will be declared null and void in court, thereby nullifying the new incentive price and VTAO offers. Moreover, a number of customers question whether any real economic benefits exist in the recently announced package.

DOE itself has produced price projections, for general distribution to its customers, which show USEC prices dropping significantly through the late 1980s and into the early 1990s. Many market analysts believe that DOE *must* lower prices approximately as projected in order to remain competitive with prices that have *already* been offered by European enrichers. Meanwhile, estimates indicate that the GNP escalator in DOE's incentive price offer could well result in an incentive SWU price of over \$110 per SWU in 1991, and \$130 or more per SWU by 1995, in year-of-delivery dollars. These price estimates are not much lower than either DOE's previous USEC price projections or prices offered by non-US enrichers in similar time frames. Many customers feel that any real savings resulting from the incentive price proposal could be negligible.

Likewise, the long-term benefits of the free VTAO are difficult to evaluate. In today's market, the value of specifying 0.3 percent tails assay versus 0.2 percent tails assay for 3.0 percent enriched product is worth about \$17.50 per SWU, according to the following equation:

$$\text{Cost of 1 kgU at 3.0 w/o} = (\text{SWU price})(\text{SWU/Product ratio}) + (\text{Feed price})(\text{Feed/Product ratio})$$

Using today's USEC price of \$125 per SWU, and the Nuexco UF₆ value of \$47 per kgU as UF₆, then:

$$\begin{aligned} \text{Cost of 1 kgU at 0.3} &= 125(3.42) + 47(6.57) = \$736.29 \\ \text{Cost of 1 kgU at 0.2} &= 125(4.31) + 47(5.48) = \$796.31 \\ \text{Price per SWU} &= \frac{796.31 - 736.29}{3.42 \text{ SWU/Product}} = \$17.55 \text{ per SWU at 0.3} \end{aligned}$$

However, the actual savings for free VTAO today would be less than \$9 per SWU. The USEC established a maximum VTAO charge of 0.7 percent of the base SWU price for every 0.01 percent the tails assay exceeds 0.20 percent. For today's prices, the maximum VTAO charge for 0.3 percent tails would be 7 percent of \$125, or \$8.75 per SWU.

In general, the lower the SWU price and higher the feed price, the less valuable the free VTAO offer becomes. By 1991 and later, however, many customers feel that feed prices should be much higher than today, and both DOE and non-DOE SWU prices should be lower. The above calculation using \$75 per kgU as UF₆ feed and \$100 per SWU indicates an advantage of only about \$3 per SWU when specifying the optimum 0.26 tails assay rather than 0.2 tails. Given most customers' expectations of higher uranium prices by 1991-1995, the only way in which the incentive price and free VTAO proposals will show any significant savings in those years would be if DOE prices also rose substantially. Under such an unlikely scenario, DOE would not be competitive with non-US SWU suppliers in the long term, and signing the USEC would have turned out to be a mistake. This is not considered a realistic possibility.

In fact, the real benefits of the free VTAO offer appear to be in the 1987-1990 time period, when uranium feed prices for many customers are expected to remain low. Virtually all USEC customers, however, have already covered their earlier uncommitted requirements through 1990, either with DOE's first incentive pricing offer (see page 2 of Report 200, April 1985) or with a non-DOE supplier. Those customers not supplied 100 percent by DOE are unable to alter their non-DOE SWU contracts to benefit from the free VTAO offer.

Because there does not appear to be clearly demonstrable economic incentive to accept the DOE offers, USEC customers will probably make their decisions based on subjective, political considerations. Non-US customers that would have chosen

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European enrichers before the announcement of the new proposal will still do so. Many US utilities will accept DOE's offer out of loyalty to DOE. But Nuexco expects some US utilities, many that have expressed concern about DOE's ability and commitment to be competitive in the long term, to continue to

commit their 30 percent of requirements to non-US enrichers. They would undoubtedly intend to develop relations with other SWU suppliers for the future, while assuring that DOE continues to have competition in the US market.

CURRENT MARKET DATA

December 31, 1985	Market Values	Active Supply ¹ (thousands)	Active Demand ¹ (thousands)
EXCHANGE VALUE	\$17.00/lb. U ₃ O ₈	3,595	2,325
UF ₆ VALUE	\$47.00/kgU		
CONVERSION VALUE	\$1.60/lb. U as UF ₆	300	0
SWU VALUE			
0.3 tails assay; delivery within one year	\$80/SWU		
LOAN RATE	5%/annum	2,000	0

	\$/lb. U ₃ O ₈	Millions of Pounds	Number of Transactions	Number of Months
TRANSACTION VALUE	16.55	2.1	11	3

¹Supply and demand tables in *Current Market Data* section of this Report detail the numbers for each category.

DEFINITIONS

- The **Exchange Value** is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.
- The **UF₆ Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.
- The **Conversion Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.
- The **SWU Value** represents Nuexco's judgment of the price at which transactions for the sale of significant quantities of SWUs of stated origin for delivery in the specified time period could be concluded as of the date indicated.
- The **Loan Rate** is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.
- The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:
 - Transactions closed within the previous three-month period for which delivery is scheduled within one year of the transaction date;
 - At least ten transactions;
 - Transactions involving a sum total of at least 2 million pounds U₃O₈ equivalent.

The sample time is extended as necessary to include these minima. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

DERIVATIONS AND COMMENTS

- All Market Values are based on:
 - Data from recently completed transactions.
 - Data from pending transactions.
 - Firm bids to buy or borrow, and firm offers to sell or lend.
 - Prices purchasers or rates borrowers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy or borrow, and prices sellers or rates lenders have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell or lend.
- Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not included in the determination of these Market Values.
- In the determination of the Conversion Value, Nuexco does not consider transportation charges other than those customarily provided by primary suppliers of conversion services.
- The prices of conversion services or SWUs delivered under long-term contracts with primary suppliers are not considered in the determination of either the Conversion Value or SWU Value.
- For the SWU Value, Nuexco converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight-percent U₂₃₅ and a product assay of 3.0 weight-percent U₂₃₅, assuming feed costs corresponding to the Nuexco Exchange and Conversion Values determined as of the same date.
- In calculating the Transaction Value, Nuexco does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future Exchange Values or any other indeterminate variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it cannot currently be determined.

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CURRENT MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES¹

Country (currency)	per lb. UOs in Concentrates			per kg. U in Concentrates		
	This Month (Dec 31, 1985)	Last Month (Nov 30, 1985)	12 Months Ago (Dec 31, 1984)	This Month (Dec 31, 1985)	Last Month (Nov 30, 1985)	12 Months Ago (Dec 31, 1984)
Australia (dollar)	24.92	24.31	18.37	64.78	63.20	47.77
Belgium (comm. franc)	854.70	861.18	960.33	2,222	2,239	2,497
Canada (dollar)	23.78	23.08	20.13	61.81	60.01	52.34
Finland (markka)	92.19	91.63	99.48	239.68	238.22	258.62
France (franc)	128.40	129.85	147.20	333.81	337.57	382.69
FRG (mark)	41.87	42.62	47.99	108.86	110.80	124.75
Italy (lira)	28,509	28,741	29,480	74,117	74,719	76,641
Japan (yen)	3,413	3,368	3,814	8,873	8,755	9,917
Netherlands (guilder)	47.16	47.82	54.08	122.60	124.31	140.59
South Africa (rand)	43.87	44.14	29.99	114.05	114.75	77.97
Spain (peseta)	2,621	2,625	2,638	6,815	6,825	6,857
Sweden (krona)	128.98	128.55	136.53	335.33	334.20	354.94
Switzerland (franc)	35.31	35.06	39.54	91.79	91.14	102.79
UK (pound)	11.82	11.41	13.10	30.73	29.66	34.05
US (dollar)	17.00	16.75	15.25	44.20	43.55	39.65

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES¹

Country (currency)	per lb. UOs in Concentrates			per kg. U in Concentrates		
	This Month (Dec 31, 1985)	Last Month (Nov 30, 1985)	12 Months Ago (Dec 31, 1984)	This Month (Dec 31, 1985)	Last Month (Nov 30, 1985)	12 Months Ago (Dec 31, 1984)
Australia (dollar)	24.26	22.93	19.16	63.07	59.62	49.80
Belgium (comm. franc)	832.08	812.34	1,001	2,163	2,112	2,603
Canada (dollar)	23.15	21.77	20.99	60.18	56.60	54.57
Finland (markka)	89.75	86.43	103.72	233.33	224.71	269.64
France (franc)	125.00	122.48	153.47	324.97	318.42	399.00
FRG (mark)	40.76	40.20	50.03	105.98	104.52	130.07
Italy (lira)	27,754	27,110	30,737	72,155	70,481	79,908
Japan (yen)	3,323	3,177	3,977	8,638	8,258	10,339
Netherlands (guilder)	45.91	45.10	56.38	119.35	117.26	146.58
South Africa (rand)	42.71	41.63	31.27	111.04	108.24	81.29
Spain (peseta)	2,552	2,476	2,750	6,635	6,438	7,149
Sweden (krona)	125.57	121.26	142.35	326.45	315.25	370.07
Switzerland (franc)	34.37	33.07	41.22	89.36	85.97	107.17
UK (pound)	11.51	10.76	13.65	29.92	27.98	35.50
US (dollar)	16.55	15.80	15.90	43.03	41.08	41.34

¹Calculated using currency exchange rates published in the *Wall Street Journal* on December 31, 1985.

CURRENT MARKET DATA

CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES¹

Country (currency)	per lb. U as UFs			per kg. U as UFs		
	This Month (Dec 31, 1985)	Last Month (Nov 30, 1985)	12 Months Ago (Dec 31, 1984)	This Month (Dec 31, 1985)	Last Month (Nov 30, 1985)	12 Months Ago (Dec 31, 1984)
Australia (dollar)	2.35	2.32	0.96	5.17	5.12	2.13
Belgium (comm. franc)	80.44	82.26	50.38	177.34	181.36	111.06
Canada (dollar)	2.24	2.20	1.06	4.93	4.86	2.33
Finland (markka)	8.68	8.75	5.22	19.13	19.30	11.50
France (franc)	12.08	12.40	7.72	26.64	27.34	17.02
FRG (mark)	3.94	4.07	2.52	8.69	8.98	5.55
Italy (lira)	2,683	2,745	1,546	5,915	6,052	3,409
Japan (yen)	321.22	321.67	200.10	708.17	709.17	441.14
Netherlands (guilder)	4.44	4.57	2.84	9.78	10.07	6.25
South Africa (rand)	4.13	4.22	1.57	9.10	9.29	3.47
Spain (peseta)	246.72	250.78	138.36	543.93	552.88	305.03
Sweden (krona)	12.14	12.28	7.16	26.76	27.07	15.79
Switzerland (franc)	3.32	3.35	2.07	7.33	7.38	4.57
UK (pound)	1.11	1.09	0.69	2.45	2.40	1.51
US (dollar)	1.60	1.60	0.80	3.53	3.53	1.76

SWU VALUE AND UFs VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES¹

Country (currency)	SWU Value delivery within one year (December 31, 1985)	UFs Value per kg. U in UFs This Month (December 31, 1985)	UFs Value per kg. U in UFs Last Month (November 30, 1985)
Australia (dollar)	117.27	68.89	66.76
Belgium (comm. franc)	4,022	2,363	2,365
Canada (dollar)	111.89	65.73	63.39
Finland (markka)	433.84	254.88	251.64
France (franc)	604.23	354.98	356.59
FRG (mark)	197.04	115.76	117.05
Italy (lira)	134,161	78,819	78,929
Japan (yen)	16,061	9,436	9,248
Netherlands (guilder)	221.91	130.37	131.32
South Africa (rand)	206.45	121.29	121.21
Spain (peseta)	12,336	7,247	7,210
Sweden (krona)	606.98	356.60	353.03
Switzerland (franc)	166.15	97.61	96.27
UK (pound)	55.63	32.68	31.34
US (dollar)	80.00	47.00	46.00

¹Calculated using currency exchange rates published in the Wall Street Journal on December 31, 1985.

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CURRENT MARKET DATA

RECENT TRANSACTIONS¹

Uranium Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U ₃ O ₈ equivalent)	Approximate Price as Percent of Current Exchange or UFs Value	Seller	Buyer	Remarks
3629	1986	50-100	97	Trader	US Utility	
3628	1986	Less than 50	97	Trader	US Utility	
3627	1986	50-100	98	US Producer	US Utility	
3626	1986	101-300	97	US Producer	US Utility	
3624	1985	50-100	94	Trader	European Utility	
3615	1986	101-300	104	Trader	European Utility	
3614	1986	101-300	105	US Producer	European Utility	

Enrichment Services

Secondary Market Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity ² (thousands of SWUs)	Approximate Price ³ as Percent of Current SWU Value ⁴	Seller	Buyer	SWU Origin	Remarks
3625	1986	50-100	95	European Utility	US Utility	DOE	

¹Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.

²If tails assay is unknown or unspecified, Nuexco's calculation of SWU quantity assumes 0.20 w/o tails assay.

³Price is not normalized to 0.20% tails assay.

⁴Refers to SWU Value that corresponds to SWUs included in transaction. When prices and SWU values are expressed as discounts (e.g. X dollars less than DOE's USEC base price at time of delivery), the percentage refers to the ratio of the discounts, not the ratio of the prices.

⁵The notation R means that Nuexco either does not know, or that Nuexco has restricted that information to protect client confidentiality.

CURRENT MARKET DATA

URANIUM SUPPLY (December 31, 1985)

Nuenco Project Number	Delivery Period ¹ (Thousands of Pounds U ₃ O ₈)		Remarks
	Spot or Near-term ²	Intermediate or Long-term	
Available for Sale:			
ACTIVE			
1860	500	500	UF ₆
2335	275	—	
2483	70	—	
2680*	500	500 per year	1987-92
2728	350	—	
2740*	100	—	
2793	1,000	—	
2802	200	—	
2814	500	500	UF ₆
2818*	100	—	UF ₆
2263	—	400 per year	1987 on
2625	—	500 per year	1987 on
2778	—	220 per year	1987-90
2781	—	100 per year	1988-95
TOTAL:	3,595		
INACTIVE			
2336*	250	250 per year	1986-94
2389	75	75 per year	1986-90
2654	300	700 per year	UF ₆
2746	180	—	UF ₆ c
2764	260	—	UF ₆
2765	260	—	UF ₆
2777	250	—	
2804	100	—	
2297	—	200 per year	1986-89
TOTAL:	1,675		

*New or revised since last month.

¹Measured from the date of this Report.

²For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2737, 2771, 2825

NUEXCO

CURRENT MARKET DATA

URANIUM DEMAND (December 31, 1985)

Nueco Project Number	Delivery Period ¹ (Thousands of Pounds U ₃ O ₈)		Remarks
	Spot or Near-term ²	Intermediate or long-term	
Inquiries to Purchase:			
ACTIVE			
2733*	500	500 per year	1987-95
2743	325	—	UF ₆
2748*	40	—	
2758	1,000	500	UF ₆
2762	300	—	
2784	100	—	
2786*	60	—	

2217	—	1,000 per year	1989-95
2507	—	600	1987-89
2586	—	250 per year	1988-95
2681	—	500 per year	UF ₆ or U ₃ O ₈ ; 1987-88
2738	—	1,000	1989 on
2739	—	1,000 per year	1987-90
2760	—	750 per year	1986-90
2770	—	500 per year	1988-94
2796	—	175 per year	1988-92
2808	—	250	1989 on
2821*	—	120 per year	1988-93
2870*	—	100	1989

TOTAL:	2,325		
INACTIVE			
2548	290	—	
2798*	70	—	
2806*	1,000	—	

2643	—	150 per year	1987 on

TOTAL:	1,360		

*New or revised since last month.

¹Measured from the date of this Report.

²For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.

Projects removed since last month: 2769, 2772, 2786.

CURRENT MARKET DATA

LOAN SUPPLY AND DEMAND (December 31, 1985)

Nuexco Project Number	Delivery Period ¹ (Thousands of Pounds U/Os)		Remarks
	Within 1 Year	Beyond 1 Year	
Available for Loan:			
ACTIVE			
2805	2,000	—	
TOTAL:	2,000		
INACTIVE			
1938	2,000	—	UF ₆
2036	500	—	
2667	800	—	
TOTAL:	3,300		

*New or revised since last month.

¹Measured from the date of this Report.

Projects removed since last month: None.

No inquiries to borrow are reported this month.

CONVERSION SUPPLY AND DEMAND (December 31, 1985)

Nuexco Project Number	Delivery Period ¹ (Thousands of Pounds U as UF ₆)		Remarks
	Within 3 Years	Beyond 3 Years	
Available for Sale:			
ACTIVE			
2849*	300	900	1986-90
TOTAL:	300		
INACTIVE			
2051	100	—	
TOTAL:	100		
Inquiries to Purchase:			
INACTIVE			
2724	—	375	1989-93
TOTAL:	0		

*New or revised since last month.

¹Measured from the date of this Report.

Projects removed since last month: None.

NUEXCO

CURRENT MARKET DATA

SWU SUPPLY AND DEMAND (November 30, 1985)

Nuexco Project Number	Delivery Period ¹ (Thousands of SWUs)		Remarks
	Spot or Near-term ²	Intermediate or Long-term	
Available for Sale:			
ACTIVE			
2410A	350	—	
2705*	100	—	
2571	—	55	1987
TOTAL:			
	450		
INACTIVE			
2652	—	25	
2746	100	—	1986
TOTAL:			
	100		
Inquiries to Purchase:			
INACTIVE			
2761	115	—	
2797	—	150	1988-89
TOTAL:			
	115		

*New or revised since last month.

¹Measured from the date of this Report.

²For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2400.

SURFICIAL URANIUM DEPOSITS — PART TWO

This is the second part of a two-part article on surficial uranium deposits. Part One appeared in Report 208, December 1985.

Distribution of Deposits

The identification of surficial uranium has become increasingly more frequent since calcrete deposits were discovered in Australia and Africa during the early 1970s. Deposits confined to the four climatic environments described in Part One are known to occur in a number of locations throughout the world. Studies indicate that as much as 10 to 15 percent of global uranium resources could be contained in surficial deposits.¹ However, the economics of recovery will continue to determine the commercial availability of surficial uranium. Few (if any) such deposits could be exploited and marketed successfully under current market conditions.

Australia — The greatest resource potential for surficial uranium is associated with the calcrete-type deposits in arid climates. Significant deposits of this type occur in Western Australia, the largest being Yeelirrie. It is estimated to contain over 50,000 metric tons U₃O₈ at an average grade of 0.15 percent uranium. The deposit is situated in a large paleodrainage system in a calcrete and dolocrete environment. Uranium has accumulated by the process of evaporation and precipitation from uranium-bearing groundwater. Carnotite is the only uranium mineral present in the deposit.

The Yeelirrie deposit is situated in the northern part of a large granitic area referred to as the Yilgarn Block. The entire region has undergone extensive weathering and geologic change. Forty to fifty separate uranium occurrences have been discovered in the Yilgarn Block; eight of them have been thoroughly detailed and considered for exploitation at various times. Two of the better-known deposits in that group are Lake Way and Minindi Creek. Each of the eight deposits has characteristics similar to Yeelirrie; they are confined to a fluvial or playa depositional environment. The age of the Yilgarn Block deposits has been estimated at between 25,000 years and 750,000 years. The younger deposits in the Yilgarn Block are likely to have been formed by redistributed uranium from the older deposits.

Namibia — At least ten important surficial uranium deposits have been discovered in the central Namib Desert region of Namibia. Six of the ten deposits, of which the Langer Heinrich is the largest, together contain over 30,000 metric tons of U₃O₈. The other five deposits are Spitskoppe and Trekkoppe to the north, and Tumas, Tubas and Aussanais to the south. All deposits occur in the Langer Heinrich and Tumas channel-filling formations consisting of fine to large boulder conglomerates. The formations are part of the Namib Group of Tertiary age,

which have filled meandering paleochannels cut into the Damara basement rocks. All but one deposit has developed in a calcrete (calcrete) or dolomite (dolocrete) environment. One deposit, Tubas, is associated with gypsiferous (gypcrete) sediments in the Tumas formation. Carnotite is the uranium mineral present in all deposits, occurring in close association with the cementing minerals.

Other Africa — Fluvial and playa deposits of less important size and grade occur in arid to semi-arid climates of South Africa, Botswana, Algeria and Somalia. The uranium occurs as an evaporite or a precipitant in Tertiary sediments, usually associated with calcrete or gypsum. Carnotite is again the most common uranium mineral, but torbernite and autunite have been recognized in certain deposits. The deposits in Botswana may have formed through evaporation of uranium-bearing water moving by capillary action upward through Karoo sediments into the lower Kalahari sediments. All of these deposits are small and none are under consideration for development. (A number of similar deposits have been found in Argentina. Some of those deposits are being exploited, even though the average uranium content is relatively low.)

Europe — Uranium occurrences in the cold climate wetland belt are known to exist in the United Kingdom, Sweden and Finland. An organic-rich environment, one in which uranium was absorbed by the organic matter, is common to all occurrences. The European occurrences are perhaps more of a mineral curiosity than a deposit. Every occurrence is associated with a peat bog overlying bedrock of uraniferous granite.

Five peat bogs in the United Kingdom are known to contain uranium values of less than 600 ppm. In each case, potential tonnage of uranium is extremely small. Finland is known to have at least 20 peat bogs with evidence of contained uranium. The uranium values in seven bogs were determined at between 0.10 percent and 2.40 percent U₃O₈. The occurrences are also small and represent only a limited source base.

Sweden conducted a nationwide search for uranium during the 1950s. A large number of uranium-bearing peat bogs were recorded, three of which were found to contain uranium at grades of 0.20 percent to 3.40 percent U₃O₈. Geologists consider the source of uranium to be deep-seated spring water originating from uranium-enriched granites; the water then contacts with the organic matter along normal surface drainage channels. In all cases, radioactivity is extremely low and the presence of uranium was determined through geochemical sampling and confirmed by chemical analysis. All occurrences are too small to mine for uranium. However, if the peat is used as a fossil fuel, the ash can be collected and processed for the recovery of uranium and other contained metals such as vanadium and molybdenum.

¹Toews, P.D., *Surficial Uranium Deposits*, IAEA-TECDOC-322, 1984, page 7.

RAW MATERIALS

Canada — A few of the organic-rich deposits in western Canada and the northwestern USA may have grade and tonnage potential to be of commercial interest under reasonably better market conditions. The deposits in Canada are all located along the north-south trend of the Okanagan Valley region, within the central dry belt of British Columbia. A number of uranium occurrences have been discovered in semi-arid, alpine and permafrost environments within the southern portion of the region.

The geology of the region is complex, with Eocene (Tertiary) volcanics and sedimentary rocks filling small structural and erosional depressions within a basement complex of intrusive and metamorphic rocks. Tertiary tectonics followed the Eocene volcanics and created extensive block faulting in the northern region with moderate block faulting and north-south faults in the southern portion. Much of the region is covered by glacial debris up to 1,200 meters thick in the basin lowlands.

Surficial uranium is restricted to fluvial and lacustrine/playa environments almost always underlain by intrusive rocks, which are the source of uranium and associated mineralization. The mineralization develops in soils as an evaporite and as a precipitate in sediments at a depth of approximately three meters. Where organic-rich sediments are present, adsorption of uranium is commonplace. The highest uranium values are usually at or near the surface. The mineralization is highly mobile and deposits are being depleted and reconstituted at all times. No uranium mineral has been identified. Molybdenum is regularly associated with the uranium on a ratio of about 1:1. Small surficial uranium deposits have been noted in similar environments in Nova Scotia and New Brunswick.

The Blizzard and Tyee uranium deposits are the largest in the region, with a combined in-place reserve of about 12 million pounds U_3O_8 . Both deposits were considered for exploitation in 1980, when the provincial government initiated a seven-year ban on uranium mining. Since the moratorium, uranium exploration in British Columbia has virtually ceased.

United States — Calcrete-type uranium deposits have been identified in the Texas Panhandle area to the south of Lubbock, Texas (about 500 miles northwest of the South Texas Plains uranium district). Mineralization formed in the upper Ogallala Formation of Miocene age in a semi-arid to arid climate. Successive wet and dry periods produced a calcrete zone two to three meters thick. Carnotite mineralization is associated throughout the full thickness of the zone. The general region was uplifted in the Late Pleistocene era and the calcrete deposits are now exposed and are actively eroding away due to present drainage patterns. Known deposits are small and low-grade, with the uranium content measured in parts per million. There is some potential that additional deposits will be located throughout the Panhandle region occupied by the Ogallala Formation, but

the combined resource and economic potential for Ogallala deposits is probably negligible.

Young uranium deposits associated with organic-rich sediments occur at several different locations in the western USA. Deposits have been discovered in northern Idaho, northeast Washington, the Colorado Front Range and the Lake Tahoe area of California and Nevada. The deposits are generally located within a cold temperate belt associated with heavy moisture accumulations during the winter and hot dry summers. Uranium is carried in solution and accumulates by adsorption on organic matter and by precipitation in unconsolidated and interbedded sediments.

Known surficial deposits in northeastern Washington have the same basic geologic environment — Recent sediments covering Precambrian intrusives and metamorphic rocks. The area is covered by glacial material which may be tens of meters thick. Extensive erosion has created long narrow valleys (fluvial) which have received post-glacial sediments, in addition to organic-rich material in meadow and swamp/bog environments. Intrusives act as the source of uranium. It is leached out by solution activity, primarily during the seasonal runoff period. As the uranium-bearing water passes through the organic-rich sediments, uranium is adsorbed by the organic matter. The uranium remains highly mobile and is continually reconstituted within the immediate area or redeposited downstream in new host conditions.

Permeability of the host sediments is a major determinant of the accumulation of uranium. The highest uranium values are in shallow organic-rich zones, from grass roots to a depth of one or two feet; below that, to a depth of two or three meters, the organic content and degree of uranium mineralization decrease. The positioning of mineralization can be reversed if flooded by rising groundwater for an extended time. Uranium enrichment will occur throughout the flooded zone. Subsequently, precipitation of uranium will take place in the unconsolidated sediments as the groundwater level recedes.

Development

Development attempts have been made at only one surficial uranium deposit in the USA. Mining operations began in 1983 on the Flodelle Creek deposit, located along the upper North Fork of the Flodelle Creek drainage basin in northeast Washington. Joy Mining Company of Spokane, Washington, the owner and operator, has suspended mining pending improved market opportunities.

Uranium was first detected in the area in 1976 by geochemical sampling in the streams draining the granitic highlands. Follow-up geologic geochemical studies determined that the granitic rocks are moderate-to-highly altered and readily supply uranium

RAW MATERIALS

and associated metals to solution. The course of uranium-charged solutions was carefully charted throughout the drainage system. The studies also determined that uranium deposition occurred primarily in sedimentary fill behind a sequence of beaver dams common to the drainage environment. Beaver ponds became natural traps for the accumulation of organic-laden sediments, thereby creating the proper geochemical environment for the development of surficial uranium deposits along the drainage system.

A detailed trenching and drilling campaign was conducted within areas of interest, and the results established the existence of uranium within organic matter and fine-grained sediments from one to 16 feet thick (4.8 meters). The average thickness is 1.5 meters. Isolated uranium values exceeded 1.00 percent U_3O_8 . The highest uranium values are confined to the organic matter within four to twelve inches of the surface, suggested that uranium is still accumulating. The sampling program detailed an area of slightly more than six acres containing in-place uranium reserves of approximately 865,000 pounds U_3O_8 . Figure 1 shows a profile of the upper portion of uranium-enriched soil and unconsolidated sediments at the Flodelle Creek mine.



Figure 1. Profile-view of uranium-bearing organic soil and unconsolidated sediments at the Flodelle Creek mine. The upper soil zone (surface to line) has highest uranium content, up to 0.90% U_3O_8 ; below the line 1-2 meters is low-grade — 0.03 to 0.40%. Water in pit conceals lower 2 meters of mineralized material.

Joy Mining Company completed metallurgical studies and obtained permits for mining the deposit in 1982. Mine develop-

ment began in 1983 with preparations for draining of the meadow area by diverting normal stream flow. Developers selected a mill site on a terrace about 25 feet above and 300 feet east of the meadow; construction on a 70,000 pound-per-year mill began soon after permits were granted. Mined ore was piled to one side to dry for about 45 days, then moved to the ore stockpile at the mill. After the ore was rototilled to break up oversized pieces, moisture content had been reduced to about 40 percent and the ore was ready for milling.

The recovery process began with ore dumped into concrete filter bottom vats; ferric sulfate leach was percolated through the ore for a period of 24 hours. Figure 2 shows one of three leach vats. The pregnant ferric sulfate liquor was stripped by amine in a kerosene carrier. Leached ore was washed and removed from the leach tank; due to the lack of radioactive decay products in the ore, spent tailings were returned directly to the mined-out meadow. Uranium was extracted from the loaded amine with an ammonium sulfate wash, and precipitated with magnesium oxide. The uranium oxide was filtered, dried and packaged for shipment. Figure 3 shows the inside of the mill. Radioactive wastes from the mill process were recycled to the leach circuit; spent radioactive and chemical effluents were discharged to a lined waste pond. Several other deposits within the Flodelle Creek drainage system may eventually be mined. With processing taking place at existing facilities. A total of approximately 1,200,000 pounds U_3O_8 are available for mining.



Figure 2. One of three leach vats at end of leaching cycle. Leached material is being removed to waste pile.

RAW MATERIALS

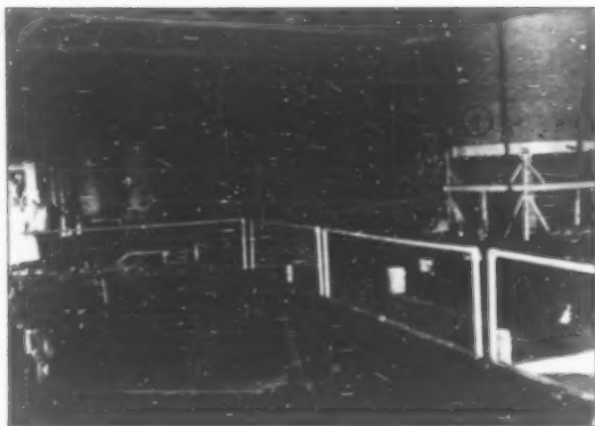


Figure 3. Inside view of the Flodde Creek uranium mill. 1 = Pregnant liquor storage and wash circuit; 2 = ion exchange circuit; 3 = precipitation and drying circuit.

Conclusions

Surficial uranium deposits are an integral part of world resources. Certain deposits, primarily calcrete-type in Western Australia and Namibia, and young deposits in British Columbia,

represent significant resources. However, until some of the deposits are exploited with economic success, surficial deposits should not be included among uranium reserves. Neither will the future of the industry be greatly influenced by resources from surficial deposits. The large Tertiary deposits are non-competitive in today's market. However, some recent deposits, though small, could prove economic if environmental and reclamation problems can be minimized. At least 40 to 50 possible uraniumiferous sites have been identified and await evaluation in the northeast Washington/northern Idaho district alone.¹ Thus, surficial uranium deposits may present another option for the exploration industry, especially in the USA, where alternative production techniques are becoming more attractive.

Acknowledgement

Surficial Uranium Deposits, (IAEA-TECDOC-322), Vienna, 1984), is an excellent collection of papers on surficial uranium assembled by the International Atomic Energy Agency (IAEA). It describes occurrences worldwide, with special coverages on important deposits and districts. It was of considerable use in formulating ideas and conclusions expressed in this article.

¹J. K. Otton, US Geological Survey, October 1985.

RECENT DEVELOPMENTS

AUSTRALIA

As anticipated, Western Mining Corporation and BP Australia announced in early December that the Olympic Dam project would go forward. While there had been some speculation that a decision might be deferred until it was possible to firm up purchase contracts for the planned output, the partners committed on the basis of sales negotiations that were, in their words, "proceeding satisfactorily." If, in fact, the project proceeds on schedule, uranium production would begin in 1988 at an annual rate of 4.4 million pounds U₃O₈. Notwithstanding the positive tone of the partner's announcement, placing such quantities, particularly in the early years of production, is likely to prove extremely difficult given current market conditions and the existing floor price policy of the Australian government. In addition, the partners will face stern competition for available sales opportunities, both from within their own country as well as from Canadian, African and other producers.

In this context recent statements by John Bannon, Premier of South Australia, take on added interest. Mr. Bannon is reported to have said that the federal government was monitoring the Australian uranium floor price and had agreed to adjust the way it would apply to uranium produced from the Olympic Dam project. Neither state nor federal authorities have responded to inquiries to clarify the basis of and authority for Mr. Bannon's comments. But his statement taken at face value, together with

repeated rumors and news stories about possible changes in the floor price policy reinforce the perception that changes in that policy appear inevitable. However, in view of the political sensitivity of the uranium issue, any near-term official pronouncement is unlikely. The government appears inclined to leave the matter unresolved, acting only when and if forced to as a consequence of market developments.

A sustained strengthening of spot prices to the US \$25-30 level would solve the government's problem by obviating the need to take any action at all. Conversely, if the current rise were to stall below the US \$20 level, or if prices were to weaken again, some action on the floor price would likely be needed to enable the partners to sell their production.

CORRECTION

In the *FOCUS* article on Belgium's nuclear power program (Report 208, December 1985), an item on page 14 incorrectly stated that Synatom manages the nation's nuclear plants. That reference should have read:

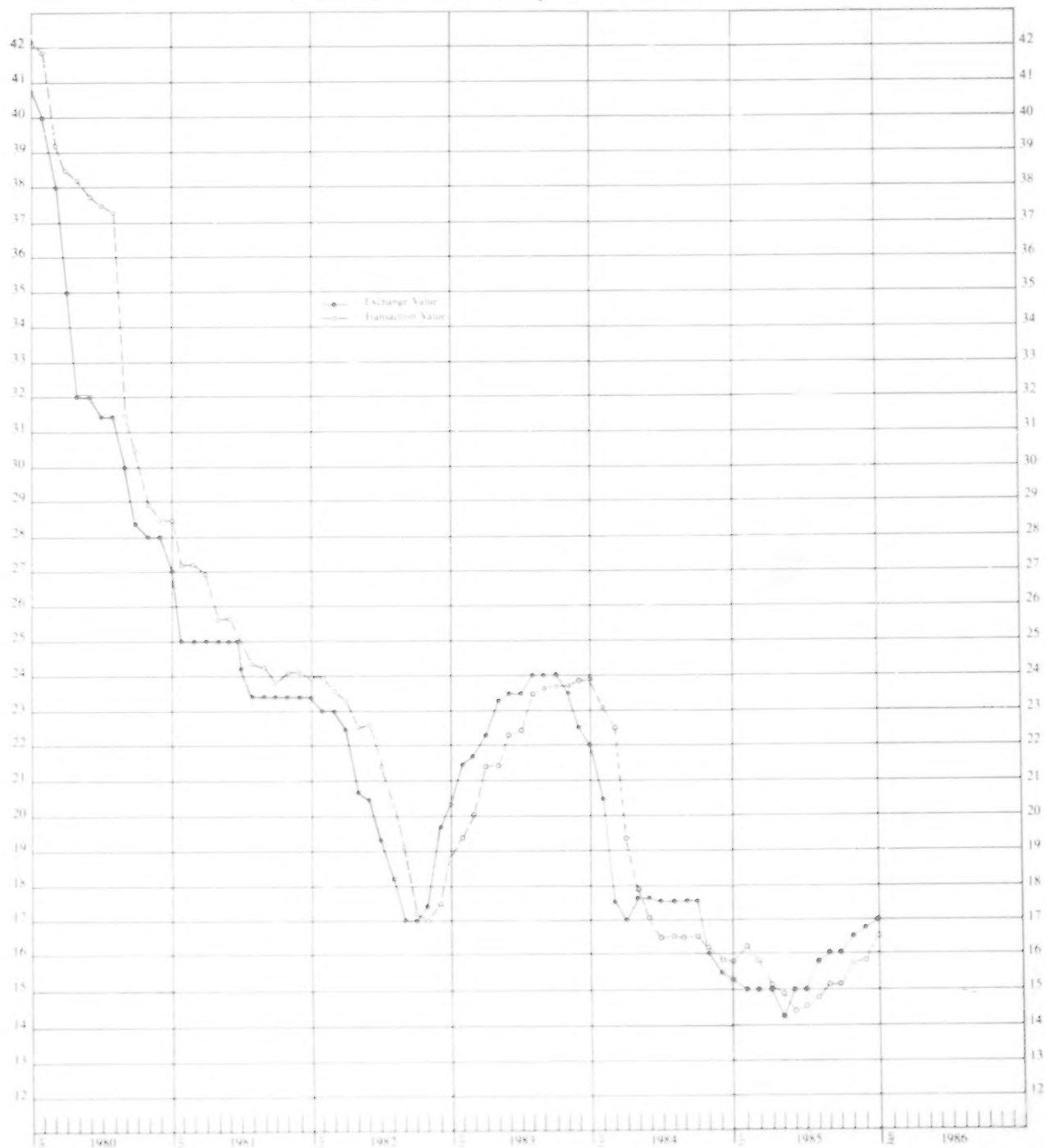
Fuel procurement *and fuel management* for the seven Belgian nuclear reactors (except for fabrication and in-core management) is handled by Synatom SA, located in Brussels.

NUEXCO

HISTORICAL MARKET DATA

EXCHANGE AND TRANSACTION VALUES SINCE JANUARY 1980

Determined as of the last day of the month indicated



HISTORICAL MARKET DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U₃O₈)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	32.50	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	15.00	15.00	15.75	16.00	16.00	16.50	16.75	17.00

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U₃O₈)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	14.45	14.60	14.75	15.10	15.10	15.75	15.80	16.55

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U as UF₆)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	1.50	1.60	1.60	1.60	1.60	1.60	1.60	1.60

NUEXCO

GOVERNMENT STATISTICS

AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups ¹ (1969=100) (1976=100)	Award Rates of Pay Indexes Australia—Adult Males In Mining Wage and Salary Earners, Weekly Rates ²
1975 Avg.	150.4	132.6
1976 Avg.	168.4	160.9
1977 Avg.	192.0	179.0
1978 Avg. ^{3 4}	198.5	190.0
1979 Avg.	248.8	127.9
1980 Avg.	321.8	140.8
1981 Avg.	355.3	154.1
1982 Avg. ⁵	368.6	174.9
1983 Avg.	401.2	181.8
Jan 1984	399.2	188.7
Feb 1984	402.5	188.6
Mar 1984	403.9	188.4
Apr 1984	404.2	196.2
May 1984	403.8	197.0
Jun 1984	404.9	197.4
Jul 1984	408.3	197.4
Aug 1984	413.2	197.4
Sep 1984	411.9	197.4
Oct 1984	408.5	197.4
Nov 1984	407.1	197.4
Dec 1984	406.0	197.4
FY84 Avg. ⁶	402.1	—
FY85 Avg. ⁶	422.2	—
Jan 1985	409.3	197.4
Feb 1985	416.1	197.4
Mar 1985	430.9	197.4
Apr 1985	440.8	202.3
May 1985	454.4	202.3
Jun 1985	458.9	202.4
Jul 1985	459.0	202.3
Aug 1985	454.9	202.4
Sep 1985	447.7	202.4
Oct 1985	—	202.4

P = Preliminary R = Revised since last month

¹Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0).
²Australian Bureau of Statistics, Canberra: "Award Rates of Pay Indexes, Australia" (Catalogue No. 6312.0). Figures for the latest fourteen months shown are subject to revision.
³Monthly data for 1970-78 appear on pages 4.7 and 4.8 of Report 138.

⁴Annual averages prior to 1979 reflect index base no longer in use.

⁵Monthly data for 1979-82 appear on page 35 of Report 184.

⁶Annual averages are for financial year ending June 30.

GOVERNMENT STATISTICS

CANADA

		Wage-earner Data: Average Hourly Earnings (C\$) ²					
Industry Selling Price Index: Manufacturing ¹ (1971 = 100)		Uranium Mines (SIC 057)	Metal Mines (SIC 051-059)	Mines, Quarries and Oil Wells ³ (SIC 051-099)	Primary Metal Industries Non-ferrous ⁴ (SIC 296) (SIC 298)		Chemicals and Chemical Products ⁵ (SIC 372-379)
1979 Avg. ⁶	217.9	—	9.60	9.66	—	—	7.67
1980 Avg.	247.2	—	10.58	10.80	—	—	8.50
1981 Avg.	288.7	—	12.02	12.23	—	—	9.53
1982 Avg. ⁷	288.8	—	13.74	13.92	—	—	10.63
1983 Avg.	298.8	—	—	14.30	—	—	11.17
Jan 1984	305.4	17.74	15.27	14.74	11.91	10.84	11.69
Feb 1984	306.6	17.90	15.59	14.90	12.04	10.82	11.51
Mar 1984	308.7	18.05	15.52	14.82	12.14	10.84	11.58
Apr 1984	310.5	18.06	15.83	15.10	11.96	10.34	11.63
May 1984	310.6	18.48	15.64	15.06	12.11	10.16	11.65
Jun 1984	311.0	18.08	15.48	14.80	12.38	10.40	11.66
Jul 1984	312.9	17.81	15.72	14.92	12.53	10.18	11.82
Aug 1984	312.7	17.24	15.36	14.92	12.44	10.34	11.78
Sep 1984	312.3	17.68	15.96	15.34	12.51	10.52	11.90
Oct 1984	312.3	17.64	16.15	15.26	12.69	10.56	11.96
Nov 1984	313.6	18.04	16.13	15.43	12.47	10.51	11.96
Dec 1984	314.2	17.95	16.39	15.60	12.16	10.40	11.99
1984 Avg.	310.9	17.88	—	15.07	12.28	10.49	11.76
Jan 1985	315.9	18.05	16.13	15.60	12.32	10.80	12.04
Feb 1985	316.5	18.78	16.41	15.68	12.52	11.05	12.06
Mar 1985	318.0	18.24	16.21	15.57	12.44	10.97	12.02
Apr 1985	318.3	18.63	16.44	15.80	12.81	11.23	12.04
May 1985	318.8	19.41	16.51	15.63	12.76	11.25	12.15
Jun 1985	319.1	18.49	16.20	15.49	12.89	11.14	12.14
Jul 1985	319.4	18.14	16.19	15.41	12.96	11.17	12.13
Aug 1985	319.2	17.07	15.76	15.30	12.97	11.31	12.19
Sep 1985	319.4	17.92P	16.16P	15.61P	12.94P	11.38P	12.40P
Oct 1985	320.2P	—	—	—	—	—	—

P = Preliminary R = Revised since last month

¹Statistics Canada, Prices Division, Ottawa: "Industry Price Indexes" (Catalogue 62-011). Indexes for the most recent six months shown are subject to revision.

²Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa: "Employment, Earnings and Hours" (Catalogue 72-002).

³Reports 175 through 185 list this series title incorrectly as "Metal Mining, Including Milling (SIC 050-099)."

⁴Beginning with the April 1983 figure, Primary Metal Industries, non-ferrous is split into SIC 296 and SIC 298.

⁵Chemical and Chemical products prior to April 1983 was SIC 370-379. The new series is from a new survey which includes all companies and is based on a 1970 classification. The old survey only included companies of 20 employees or more.

⁶Monthly ISPI for 1977 and 1978 appear on page 4.10 of Report 138, and monthly wage-earner data for 1973-78 appear on page 4.11 of Report 138.

⁷Monthly data for 1979-1982 appear on page 37 of Report 184. On that page, the wage earner index entitled "Metal Mining, Including Milling (SIC 050-099)" should read "Total Mining (SIC 051-099)."

⁸Beginning with the April 1983 figure, Wage Earner Data are based on a census of all companies employing 200 or more wage earners, plus a random survey of companies employing fewer than 200 wage earners. Prior to April 1983 only companies employing 200 or more wage earners are included in the Wage Earner Data.

NUEXCO

GOVERNMENT STATISTICS

REPUBLIC OF SOUTH AFRICA

		Average Declared Working Costs per per Metric Ton of Gold Ore Milled (Rand) ¹	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled (March 1982 = 100) ²	Consumer Price Index ³ (1980 = 100) ⁴	Producer Price Index All Groups ⁵ (1980 = 100)	Total Employment in Mining and Quarrying (Code 35) ⁶	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40) ⁶
1975	Avg.	16.71	—	157.2	100.0	639,473	1,003,617
1976	Avg.	19.30	—	174.7	115.1	671,240	1,212,983
1977	Avg.	23.87	—	194.4	130.0	712,006	1,420,670
1978	Avg.	27.14	—	137.2	142.7	664,571	1,537,169
1979	Avg. ⁷	30.18	—	155.3	164.5	692,209	1,830,632
1980	Avg. ⁸	35.53	—	176.7	192.1	714,379	2,279,615
1981	Avg.	41.89	—	206.5	218.3	728,506	2,820,505
1982	Avg. ⁹	47.25	104.2	233.5	248.7	707,552	3,246,071
1983	Avg.	51.87	115.0	262.2	274.8	696,579	3,644,772
Jan	1984	—	—	274.7	283.3	689,807	326,619
Feb	1984	—	—	278.4	286.5	702,553	335,906
Mar	1984	55.30	123.1	281.9	288.0	715,628	342,332
Apr	1984	—	—	286.1	290.2	712,963	327,550
May	1984	—	—	288.3	292.6	710,040	327,937
Jun	1984	56.95	126.2	291.2	295.3	717,009	347,121
Jul	1984	—	—	295.1	296.0	717,121	369,964
Aug	1984	—	—	297.0	300.8	721,905	361,357
Sep	1984	60.64	133.2	299.9	304.1	721,470	359,218
Oct	1984	—	—	303.7	308.7	717,865	363,755
Nov	1984	—	—	307.4	312.8	717,396	369,771
Dec	1984	62.92	138.6	309.4	315.9	701,198	365,234
Jan	1985	—	—	177.1	166.6	711,366	376,777
Feb	1985	—	—	182.8	171.3	727,932	361,823
Mar	1985	64.48	142.4	183.6	173.0	708,809	371,380
Apr	1985	—	—	187.4	174.0	724,187	369,005
May	1985	—	—	189.5	177.7	708,085	373,478
Jun	1985	67.42	148.9	191.9	179.2	724,587	395,543
Jul	1985	—	—	193.6	180.7	738,228	419,106
Aug	1985	—	—	195.6	183.2	734,121	416,777
Sep	1985	70.47	155.3	197.8	184.8	—	—
Oct	1985	—	—	200.8	188.1	—	—
Nov	1985	—	—	203.4	—	—	—

¹Chamber of Mines of South Africa, Johannesburg: "Analysis of Working Results," published quarterly.

²Page 16 of Report 178 contains description and calculation of index, and page 24 of Report 178 lists figures for 1982.

³Republic of South Africa Department of Statistics, Pretoria: "Government Gazette: Consumer Price Index for Urban Areas."

⁴The basis for calculation prior to January 1985, 1975 = 100. For annual averages prior to 1978, April 1970 = 100.

⁵Previously known as the Wholesale Price Index, now the Producer Price Index. The computation remains the same. The basis for calculation prior to January 1985, 1975 = 100.

⁶Bulletin of Statistics, Department of Statistics, Pretoria.

⁷Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Report 140.

⁸Monthly data for Codes 35 and 40, 1977-1980, appear on page 28 of Report 157.

⁹Monthly data for 1979-82 appear on page 39 of Report 184.

UNITED STATES

GOVERNMENT STATISTICS

	Producer Price Index ¹		Consumer Price Index ² (1967 = 100)	GNP Implicit Price Deflator ³ (1972 = 100)	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US\$) ⁴			
	Industrial Commodities (1967 = 100)	All Commodities (1967 = 100)			Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1978 Avg. ⁵	209.4	209.3	195.4	150.42	8.23	8.56	7.02	5.82
1979 Avg.	236.5	235.6	217.4	163.42	9.27	9.50	7.60	6.32
1980 Avg.	274.8	268.8	246.8	178.64	10.26	10.63	8.30	6.94
1981 Avg.	304.1	293.4	272.4	195.51	11.55	11.98	9.12	7.62
1982 Avg. ⁶	312.3	299.3	289.1	207.15	12.33	12.94	9.96	8.21
1983 Avg.	315.8	303.1	298.4	215.63	12.57	13.43	10.59	8.65
Jan 1984	319.1	308.0	305.2	—	12.68	13.37	10.88	8.91
Feb 1984	320.6	308.9	306.6	—	12.83	13.33	10.87	8.91
Mar 1984	321.9	311.0	307.3	220.58	12.89	13.32	10.96	8.94
Apr 1984	322.5	311.4	308.8	—	12.94	13.29	10.94	8.94
May 1984	323.3	311.7	309.7	—	13.02	13.36	11.99	8.94
Jun 1984	323.9	311.4	310.7	222.40	12.99	13.39	11.00	8.97
Jul 1984	324.0	312.0	311.7	—	13.06	13.34	11.09	9.00
Aug 1984	323.5	310.9	313.0	—	13.15	13.50	11.09	9.05
Sep 1984	322.3	309.5	314.5	224.57	13.23	13.38	11.20	9.13
Oct 1984	323.2	309.4	315.3	—	13.26	13.53	11.29	9.15
Nov 1984	323.8	310.4	315.3	—	13.27	13.74	11.31	9.20
Dec 1984	323.0	309.9	315.5	226.10	13.32	13.64	11.34	9.32
1984 Avg.	322.6	310.3	311.1	223.43	13.05	13.43	11.08	9.04
Jan 1985	322.9	309.5	316.1	—	13.29	13.70	11.39	9.33
Feb 1985	322.5	309.2	317.4	—	13.30	13.73	11.39	9.33
Mar 1985	322.6	308.7	318.8	229.07	13.29	13.95	11.37	9.39
Apr 1985	323.8	309.3	320.1	—	13.43	13.62	11.48	9.40
May 1985	325.3	309.8	321.3	—	13.24	13.59	11.46	9.39
Jun 1985	324.8	309.2	322.3	230.55	13.23	13.66	11.52	9.46
Jul 1985	324.4R	309.0	322.8	—	13.45	13.82	11.60	9.47
Aug 1985	323.6	307.2	323.5	—	13.55	13.69	11.62	9.50
Sep 1985	322.5	305.8	324.5	231.85	13.44R	13.66	11.67R	9.55R
Oct 1985	324.4	308.0	325.5	—	13.45P	13.65P	11.71P	9.56P
Nov 1985	325.0	309.7	326.6	—	—	—	11.84P	9.63P

P = Preliminary R = Revised since last month

¹US Bureau of Labor Statistics, Washington, D.C.: "Producer Prices and Price Indexes," (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

²US Bureau of Labor Statistics, Washington, D.C.: Consumer Price Index for All Urban Consumers, US City Average, All Items.

³US Department of Commerce, Washington, D.C.: Bureau of Economic Analysis, National Income and Wealth Division: "Survey of Current Business." The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

⁴US Bureau of Labor Statistics, Washington, D.C.: "Employment and Earnings." All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

⁵Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Report 139.

Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Report 147.

Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Report 154.

Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

⁶Monthly data 1979-1982 for all listed indices appear on page 41 of Report 184.

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